

U.S. DEPARTMENT OF COMMERCE  
NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY  
(formerly National Bureau of Standards-NBS)  
OFFICE OF STANDARDS SERVICES

**Product Standard PS60-73  
Hardboard Siding**

Product Standard PS60-73, Hardboard Siding, was withdrawn by the U.S. Department of Commerce in 1982.

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The following standard was used to replace PS60-73: ANSI/AHA A135.6, Hardboard Siding.

**For further assistance, copies and information on additional standards, contact:**

**American Hardboard Association (AHA)**

1210 West NW Highway  
Palatine, Illinois 60067, USA  
Telephone: (847) 934-8800  
Fax: (847) 934-8803  
Internet: <http://www.ahardbd.org>

**American National Standards Institute (ANSI)**

11 West 42nd Street, 13th Floor  
New York, New York 10026, USA  
Telephone: (212) 642-4900  
Fax: (212) 302-1286  
Internet: <http://www.ansi.org>

ANSI contact concerning construction can be reached at (212) 642-4935; Fax: (212) 398-0023.

\* \* \* \* \*

The following standard may also be useful: ICBO 25-26, Hardboard Siding (Uniform Building Code Standards). **Contact:** International Conference of Building Officials (ICBO), 5360 South Workman Mill Road, Whittier, California 90601-2298, USA; Telephone: (562) 699-0541; Fax: (562) 692-3853; Internet: <http://www.icbo.org> .

A UNITED STATES  
DEPARTMENT OF  
COMMERCE  
PUBLICATION



# Voluntary Product Standard

PS 60-73

HARDECARD

STANDARD

219

AMERICAN NATIONAL STANDARD

American National Standard Z 39.6-1973

U.S.  
DEPARTMENT  
OF  
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of  
Standards

## **VOLUNTARY PRODUCT STANDARDS**

*Voluntary Product Standards* are developed under procedures published by the Department of Commerce in Part 10, Title 15, of the Code of Federal Regulations. The purpose of the standards is to establish nationally recognized requirements for products, and to provide all concerned interests with a basis for common understanding of the characteristics of the products. The National Bureau of Standards administers the *Voluntary Product Standards* program as a supplement to the activities of the private sector standardizing organizations.

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The benefits derived from *Voluntary Product Standards* are in direct proportion to their general recognition and actual use. Producers and distributors whose products meet the requirements of a Voluntary Product Standard may refer to the standard in advertising and on labels to promote greater public understanding of or confidence in their products. Purchasers may order products conforming to the requirements of the standards.

For copies of the *Voluntary Product Standards* procedures or for more information concerning the development and use of these standards, you may write to: Office of Engineering Standards Services: National Bureau of Standards; Washington, D.C. 20234.

UNITED STATES DEPARTMENT OF COMMERCE

• Frederick B. Dent, *Secretary*

NATIONAL BUREAU OF STANDARDS

• Richard W. Roberts, *Director*

# **Voluntary Product Standard PS 60-73**

## **Hardboard Siding**

Approved by the American National Standards Institute on December 18, 1973,  
as American National Standard A 135.6—1973

### **Abstract**

This Voluntary Product Standard covers requirements and methods of test for the dimensions, straightness, squareness, physical properties, and surface characteristics of hardboard siding. Definitions of trade terms used and methods of identifying products that comply with the standard are included.

Key words Hardboard siding; siding, hardboard.

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# Hardboard Siding

Effective October 23, 1973 (See section 6.)

(This Standard, which was initiated by the American Hardboard Association, has been developed under the *Procedures for the Development of Voluntary Product Standards* of the U.S. Department of Commerce. See Section 7, *History of Project*, for further information.)

## 1. PURPOSE

The purpose of this Voluntary Product Standard is to establish nationally recognized dimensional and quality requirements for hardboard siding and to provide producers, distributors, and users with a basis for common understanding of the characteristics of this product.

## 2. SCOPE AND CLASSIFICATION

**2.1. Scope**—This Voluntary Product Standard covers requirements and methods of test for the dimensions, straightness, squareness, physical properties, and surface characteristics of hardboard siding.<sup>1</sup> Definitions of trade terms used and methods of identifying products that comply with this Standard are included.

**Note:** As an aid in correlating U.S. customary units to metric units, conversion factors for the units used in this Standard are given in an appendix.

**2.2. Classification**—This Standard covers the following types and surfaces of hardboard siding:

### Types:

**Lap Siding**—After installation, yields a pattern of overlapped planks. This siding may either be embossed or smooth on the face.

**Panel siding**—After installation, yields a flush surface. This siding may be either embossed, grooved, or smooth on the face.

### Surfaces:

**Unprimed**—Siding that has only the surface characteristics provided by the basic manufacturing process.

**Primed**—Siding that has been coated with a primer to provide a surface more receptive to paint.

## 3. REQUIREMENTS

**3.1. General**—Products represented as complying with this Voluntary Product Standard shall meet all of the requirements specified herein. The inspection

and test procedures contained in sections 3 and 4 are to be used to determine the conformance of products to the requirements of this Voluntary Product Standard. Each producer or distributor who represents his products as conforming to this Standard may utilize statistically based sampling plans which are appropriate for each particular manufacturing process but shall keep such essential records as are necessary to document with a high degree of assurance his claim that all of the requirements of this Standard have been met. Additional sampling and testing of the product, as may be agreed upon between purchaser and seller, is not precluded by this section.

**3.2. Dimensions and tolerances**—The dimensions and tolerances for the siding shall be as specified in table 1. Thickness shall be determined in accordance with sections 146-149 of American Society for Testing and Materials (ASTM) D 1037-72a, *Standard Methods of Evaluating the Properties of Wood-Base Fiber and Particle Panel Materials*.<sup>2</sup>

**3.3. Edge straightness**—The edges of the siding shall be straight within 1/64 inch for each foot of length or width. Edge straightness shall be determined by stretching a string or wire from one corner to the adjacent corner and measuring the widest distance between the string or wire and the siding edge being tested.

**3.4. Squareness**—The difference between the lengths of the face diagonals shall not vary by more than 1/64 inch for each foot of length of the siding. Opposite sides of the siding shall not vary in length more than 1/8 inch.

**3.5. Physical properties**—The siding shall be manufactured primarily of inter-felted ligno-cellulosic fibers, consolidated under heat and pressure in a hot-press to a density of not less than 31 pounds per cubic foot, and shall have the properties specified in table 2 when tested in accordance with the test methods indicated therein. Specimens shall be selected for testing as diagramed in figure 1.

<sup>1</sup> Other Voluntary Product Standards cover:

a. Basic hardboard  
b. Prefinished hardboard paneling

<sup>2</sup> Later issues of this publication may be used providing the requirements are applicable and consistent with the issue designated. Copies are obtainable from the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pa. 19103.

TABLE 1. Dimensions and tolerances for hardboard siding

Type of siding	Dimensions (nominal)			Length and width	Tolerances	
	Length	Width <sup>a</sup>	Thickness		Thickness	
	feet	inches	inches	inches	nominal thickness	min - max
					inches	inches
Lap siding	4 through 16 in 2-foot increments	4, 6, 8, 9, 10 and 12	3/8 7/16	plus 0 minus 1/8 for all lengths and widths	1/4 (0.250)	0.220-0.265
Panel siding	4, 6, 7, 8, 9, 10 and 12	48	1/4 3/8 7/16		3/8 (.375)	.325-.375
					7/16 (.438)	.376-.450

<sup>a</sup> Pertains to the exposed width; actual width may be greater due to certain edge details such as shiplapped edges.

**3.6. Face surface characteristics**— All face characteristics shall be uniform in appearance and shall be as free from visible defects in the surface plane as commercially practicable when visually inspected by an individual competent in the field.

**3.7. Linear expansion**—The siding shall meet the maximum linear expansion requirements specified in table 3 when tested in accordance with sections 107-110 and Note 39 of ASTM D 1037-72a; except that, the test specimens for lap siding shall be cut parallel with the long dimension of the siding.

Figure 1. Test specimen cutting diagram for hardboard siding.<sup>a</sup>

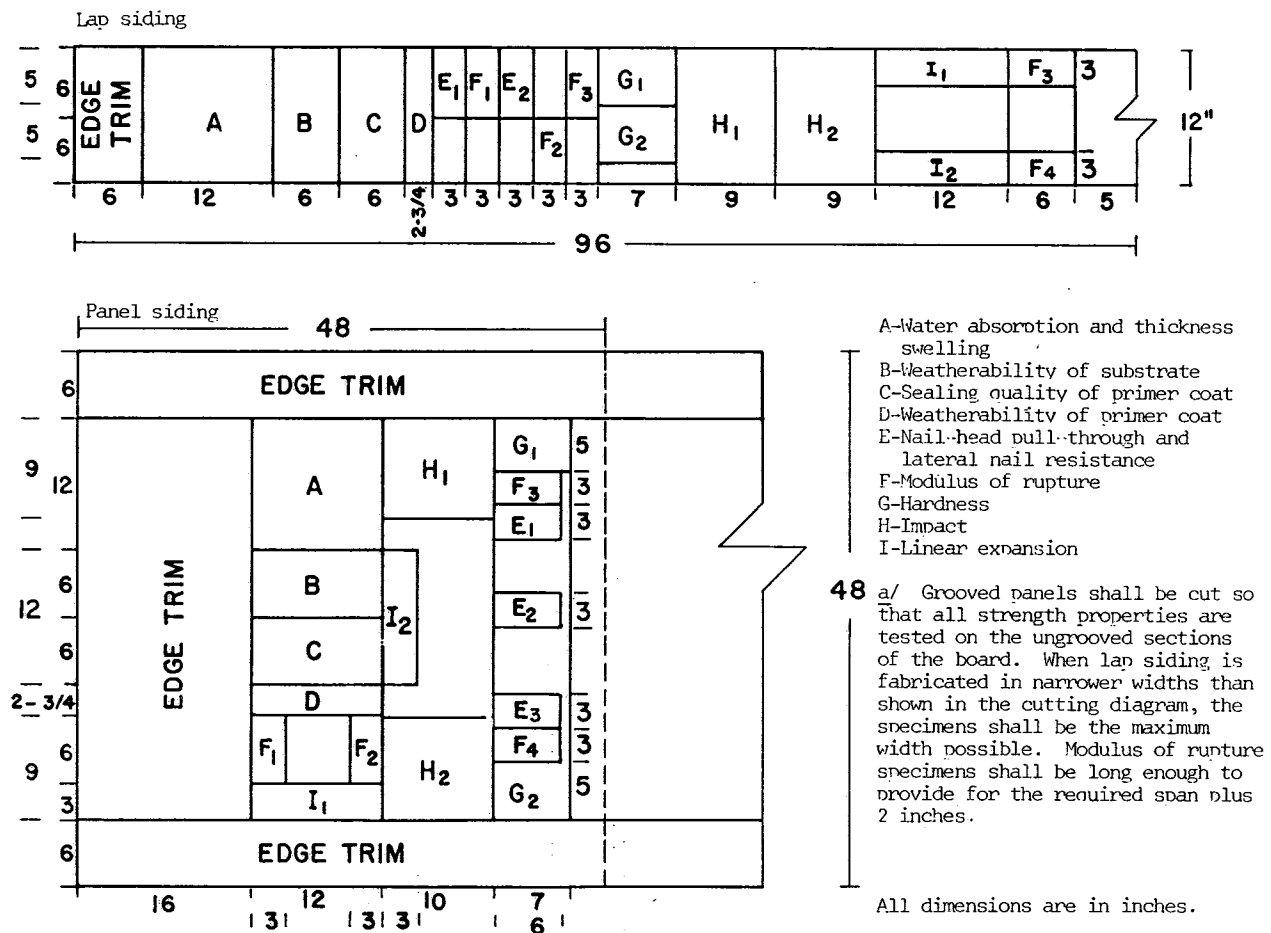


TABLE 2. Physical properties of hardboard siding

Property	Requirement	Test method <sup>a</sup>
Percent water absorption based on weight (max av per panel)	Primed 15 Unprimed 20	Sections 158 and 159
Percent thickness swelling (max av per panel)	Primed 10 Unprimed 15	Sections 158 and 159
Weatherability of substrate (Max swell after 5 cycles), in raising	0.010 & no objectionable fiber raising	4.1 of this Standard
Sealing quality of primer coat	No visible flattening	4.2 of this Standard
Weatherability of primer coat	No checking, erosion, or flaking	4.3 of this Standard
Nail-head pull-through, 1b (min av per panel)	150	Sections 54-60; except that specimens shall be tested in the dry condition. Three 6-penny (0.113 inch wire diameter and 17/64 inch head diameter) nails shall be used per specimen. The nails shall be driven into the specimen at least 1 inch apart. The holding fixture shall consist of a plate with a 1 1/2-inch diameter opening centered in it, and the speed of testing shall be at a rate of 0.125-0.175 inch per minute.
Lateral nail resistance, 1b (min av per panel)	150	Sections 41-46; except that specimens shall be tested in the dry condition. One 8-penny (0.131 inch diameter) nail shall be used per specimen spaced 3/8 inch from any specimen edge. <sup>b</sup> Testing speed shall be 0.125-0.175 inch per minute.
Modulus of rupture (min av per panel), psi	1800 for 3/8 & 7/16-inch-thick siding 3000 for 1/4-inch-thick siding	Sections 150-153; except that specimens of siding having a nominal thickness of 7/16 inch shall have a span of 4 inches between supports.
Hardness (min av per panel), 1b	450	Sections 68-73
Impact (min av per panel), in	9.0	Sections 91-95 except that the initial drop shall be 9 inches. Failure shall be when a visible fracture occurs at the bottom surface of the specimen.
Moisture content, <sup>c</sup> percent	2.0 - 9.0 incl., and not more than 3 percent variance between any two boards in any one shipment or order.	Sections 160 and 161

<sup>a</sup> Unless otherwise indicated, the test method reference pertains to sections in ASTM D 1037-72a (see footnote 2, p. 1).

<sup>b</sup> Galvanized nails may bend; therefore, a steel carding pin or steel drill rod of the same diameter may be used.

<sup>c</sup> Since hardboard is a wood-base material, its moisture content will vary with environmental humidity conditions. When the environmental humidity conditions in the area of intended use are a critical factor, the purchaser should specify a moisture content range more restrictive than 2 to 9 percent, so that fluctuation in the moisture content of the siding will be kept to a minimum.

TABLE 3. *Maximum linear expansion*

Type of siding	Thickness range	Maximum linear expansion
Lap	<i>inches</i> 0.325-0.375 over 0.376	<i>percent</i> 0.38 0.40
Panel	0.220-0.265 0.325-0.375 over 0.376	0.36 0.38 0.40

#### 4. INSPECTION AND TEST PROCEDURES

##### 4.1. Weatherability of substrate—

**A. Apparatus**—The apparatus shall consist of a forced-air-circulating oven, a micrometer reading to 0.001 inch, and a controlled temperature bath.

**B. Test specimen**—Primed specimens shall be tested as received. Unprimed specimens shall be primed on the face side only with a primer meeting the requirements of Federal Specification TT-P-25c, *Primer Coating, Exterior (Undercoat for Wood, Ready-Mixed, White and Tints)*,<sup>3</sup> applied at a rate of 450 square feet per gallon. The edges of the specimens shall not be primed.

##### C. Procedure—

- (1) Condition the specimen in the oven at 135 °F for 24 hours.
- (2) Remove the specimen from the oven and measure its thickness to the nearest 0.001 inch at the midpoint of its four sides,  $\frac{3}{8}$  inch in from the edge.
- (3) Five minutes after removal from the oven, immerse the specimen face down in 1 inch of water which is maintained at  $70 \pm 2$  °F.  
Position the specimen with small supports so that the face is 0.05 to 0.10 inch below the water surface and leave immersed for 4 hours.
- (4) Remove the specimen from the water and remeasure it as described in (2) above.
- (5) Place the specimen in the oven at 135 °F for 20 hours.
- (6) Repeat steps (2) through (5) above for a total of five cycles.

**D. Calculation and inspection**—The average increase in thickness of the four measurements described in (2) above, between an oven-dried and water-immersed condition, shall be calculated for each

<sup>3</sup> Later issues of this publication may be used providing the requirements are applicable and consistent with the issue designated. Copies of Federal Specifications are available from Specification Sales (3FRDS) Bldg. 197, Washington Navy Yard, General Services Administration, Washington, D.C. 20407.

cycle. Any fiber raising observed after the fifth cycle shall be reported.

##### 4.2. Sealing quality of primer coat—

**A. Material**—Paint meeting the requirements of Federal Specification TT-P-105a, *Paint, Oil, Chalk-Resistant, Lead-Free, Exterior Ready-Mixed, White and Tints*.<sup>3</sup>

**B. Procedure**—Apply one coat of paint by brush to the primed test specimen at a rate of 500 square feet per gallon. Allow the paint to dry for 24 hours and examine the test specimen for any flattening of the paint caused by penetration. Flattening caused by scratches or other damage to the primer coat from improper handling should be disregarded.

##### 4.3. Weatherability of primer coat—

**A. Apparatus**—A weathering appliance of Type D or DH as described in ASTM E 42-69, *Recommended Practice for Operating Light- and Water-exposure Apparatus (Carbon-Arc Type) for Exposure of Nonmetallic Materials*,<sup>4</sup> and paint meeting the requirements of Federal Specification TT-P-105a.

##### B. Procedure—

- (1) The primed siding specimen shall be placed in the weathering appliance and tested for 3 weeks using the following cycle:
  - (a) Expose the specimen to 102 minutes of light only followed by 18 minutes of light with a spray.
  - (b) Repeat (a) for a total of 20 hours.
  - (c) Allow the specimen to rest for 4 hours.
  - (d) Repeat (a), (b), and (c) for 5 days and then allow the specimen to rest for 48 hours.
- (2) After 3 weeks, the specimen shall be brush-painted with one coat at a spreading rate of 500 square feet per gallon. Allow the paint to dry for 1 week before exposing the specimen for an additional 9 weeks in the weathering appliance, cycled as described in (1) above.

**C. Inspection**—Inspect for any visible defect (checking, cracking, erosion, or flaking) after 3 weeks, before painting; and after 13 weeks.

<sup>4</sup> See footnote 2, page 1.

## 5. DEFINITIONS

For the purposes of this Standard, the following definitions shall apply:

**Checking**—Slight breaks in the primer coat that do not penetrate the substrate.

**Cracking**—Breaks in the primer coat which allow the substrate to become visible.

**Erosion**—The wearing away of the primer coat to expose the substrate.

**Fiber raising**—The swelling of individual wood fibers on the board surface which causes them to be raised above the plane of the board surface.

**Flaking**—The detachment of the primer coat from its substrate.

## 6. EFFECTIVE DATE AND IDENTIFICATION

The effective date of this Standard is October 23, 1973. As of the effective date, reference to PS 60-73 may be made in contracts, codes, advertising, invoices, product labels, and the like, but no product may be advertised or represented in any manner which would imply or tend to imply approval or endorsement of that product by the National Bureau of Standards, the Department of Commerce, or by the Federal Government.

The following statements are suggested for use in representing products as conforming to all requirements of this Standard:

- (1) "This (lap or panel) (primed or unprimed), hardboard siding conforms to all requirements established in Voluntary Product Standard PS 60-73, developed and published in accordance with the U.S. Department of Commerce *Procedures for the Development of Voluntary Product Standards*. Full responsibility for the conformance of this product to the standard is assumed by (name and address of producer or distributor)."
- (2) "Conforms to PS 60-73, (lap or panel), (primed or unprimed) (name and address of producer or distributor)."

## 7. HISTORY OF PROJECT

In 1969, the American Hardboard Association requested that the National Bureau of Standards initiate

a standard for hardboard siding under the *Procedures for the Development of Voluntary Product Standards*. A proposed standard was submitted to the Standing Committee in May 1973. The recommended Standard was then circulated for acceptance in July 1973. The responses to this circulation indicated consensus among producers, distributors, and users in accordance with the published procedures.

The new standard was designated Voluntary Product Standard PS 60-73, *Hardboard Siding*, and became effective on October 23, 1973.

*Technical Standards Coordinator:*

Karl G. Newell, Jr., Office of Engineering Standards Services, National Bureau of Standards, Washington, D.C. 20234

## 8. STANDING COMMITTEE

A Standing Committee has been appointed to assist in keeping this Voluntary Product Standard up to date. The names of the members of the committee are available from the Office of Engineering Standards Services, Washington, D.C. 20234, which serves as the secretariat of the committee.

## APPENDIX

The conversion factors and units contained in this appendix are in accordance with the International System of Units (abbreviated SI for *Système International d'Unités*). The SI was defined and given official status by the 11th General Conference on Weights and Measures which met in Paris in October 1960. For assistance in converting U.S. customary units to SI units, see ASTM E 380, *ASTM Standard Metric Practice Guide*, available from the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pa. 19103. The conversion factors for the units found in this Standard are as follows:

1 inch = 25.4 millimeters

1 foot = 0.3048 meter

1 pound per square inch =  $6.894\,757 \times 10^3$  pascals

1 pound-force = 4.448 222 newtons

$t_C = (t_F - 32) / 1.8$

where:

$t_C$  = temperature in degrees Celsius

$t_F$  = temperature in degrees Fahrenheit

# **HARDWOOD DIMENSION LUMBER**

(Second Edition)

## **COMMERCIAL STANDARD CS60-48**

[Supersedes CS60-36]

Effective Date for New Production From February 25, 1948



**A RECORDED VOLUNTARY STANDARD  
OF THE TRADE**

**UNITED STATES DEPARTMENT OF COMMERCE**

**W. AVERELL HARRIMAN, Secretary**

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## COMMODITY STANDARDS

Simplified Practice Recommendations and Commercial Standards are developed by manufacturers, distributors, and users in cooperation with the Commodity Standards Division of the National Bureau of Standards. The purpose of Simplified Practice Recommendations is to eliminate avoidable waste through the establishment of standards of practice for stock sizes and varieties of specific commodities that currently are in general production and demand. The purpose of Commercial Standards is to establish standard methods of test, rating, certification, and labeling of commodities, and to provide uniform bases for fair competition.

The adoption and use of a Simplified Practice Recommendation or Commercial Standard is voluntary. However, when reference to a Commercial Standard is made in contracts, labels, invoices, or advertising literature, the provisions of the standard are enforceable through usual legal channels as a part of the sales contract.

A Simplified Practice Recommendation or Commercial Standard originates with the proponent industry. The sponsors may be manufacturers, distributors, or users of the specific product. One of these three elements of industry submits to the Commodity Standards Division the necessary data to be used as the basis for developing a standard of practice. The Division, by means of assembled conferences or letter referenda, or both, assists the sponsor group in arriving at a tentative standard of practice and thereafter refers it to the other elements of the same industry for approval or for constructive criticism that will be helpful in making any necessary adjustments. The regular procedure of the Division assures continuous servicing of each effective Simplified Practice Recommendation and Commercial Standard, through review and revision, whenever, in the opinion of the industry, changing conditions warrant such action. Simplified Practice Recommendations and Commercial Standards are printed and made available by the Department of Commerce through the Government Printing Office.

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### COMMERCIAL STANDARD FOR HARDWOOD DIMENSION LUMBER

On June 26, 1936, at the instance of the Hardwood Dimension Manufacturers Association, a general conference, to which were invited representative manufacturers, distributors, and users of hardwood dimension lumber, adopted a recommended commercial standard for this commodity. This standard was accepted by the trade and promulgated as Hardwood Dimension Lumber, Commercial Standard CS60-36.

A recommended revision submitted by the Hardwood Dimension Manufacturers Association and endorsed by the standing committee, was circulated on October 15, 1947, to the trade for written acceptance. Those concerned have since accepted and approved the revised standard as shown herein.

*Project Manager:* J. W. MEDLEY, Commodity Standards Division,  
National Bureau of Standards.

*Technical Adviser:* V. B. PHELAN, Building Technology Division,  
National Bureau of Standards.

# COMMERCIAL STANDARD CS60-48

for

## HARDWOOD DIMENSION LUMBER

(SECOND EDITION)

### PURPOSE

1. The commercial standard grading rules for hardwood dimension lumber as given herein are established as a basis of common understanding between the manufacturer, distributor, exporter, and user. It is recognized that these grading specifications may not be applicable to every transaction involving the sale of hardwood dimension lumber, but they will in most cases provide basic specifications to which other requirements may be added in order that the purchaser may purchase, by grade, the type of material best suited to his needs.

### SCOPE

2. This standard provides minimum specifications for solid and glued-up hardwood dimension lumber for domestic and export trade, made in five grades of flat stock and four grades of squares. It covers a definition of the product, permissible defects, measurement, and tolerances for rough, surfaced, semifabricated, and completely fabricated hardwood dimension lumber. It also covers inspection, and a method of certifying compliance with the standard.

### DEFINITION OF PRODUCT

3. Hardwood dimension lumber, as covered by this standard, is defined as hardwoods, normally kiln-dried, which have been processed to a point where the maximum waste is left at the dimension mill, and the maximum utility delivered to the user. It is manufactured from rough boards and flitches to the specific requirements of a particular plant or industry. It is in specified thicknesses, widths, and lengths, or multiples thereof. It may be solid or glued-up, as specified. It is classified as rough dimension, surfaced dimension, semifabricated dimension, or completely fabricated dimension.

4. Rough hardwood dimension consists of blanks sawed and ripped to certain sizes.

5. Surfaced and semifabricated hardwood dimension is rough dimension carried one or more steps further. It may include one or more of several operations as surfacing, molding, tenoning, drum-sanding, equalizing, trimming, mitering, etc., but will not make the product a completely fabricated one ready for assembly.

6. Completely fabricated hardwood dimension is that which is ready for assembly into whatever type of product it is to be used.

## GENERAL REQUIREMENTS

7. All hardwood dimension lumber sold as conforming to this standard shall meet the following general requirements:

8. *Seasoning.*—Material shall be properly dried according to accepted methods for the thickness and species in question within the range of moisture content agreed upon. Because of the tendency of wood to change in moisture content with changes in atmospheric conditions, no specific percentage of moisture content can be guaranteed when the hardwood dimension lumber reaches its destination. Shippers shall exercise all possible care in the seasoning and handling of their products to assure delivery in suitable condition.

9. *Gluing.*—Glued-up hardwood dimension lumber shall be bonded with high-grade glue and in such manner as to provide strong joints. Type of glue used and kind of joint shall be a matter of contract between buyer and seller.

10. *Workmanship.*—All hardwood dimension lumber shall be well manufactured, of good workmanship, and shall conform to the various grades as hereinafter defined.

## DETAIL REQUIREMENTS—GRADES

## FLAT STOCK

11. In rough dimension lumber of any grade, those blemishes that will be removed in planing or dressing to finished thickness shall be permitted.

12. The standard grades of flat-stock hardwood dimension lumber are as follows:

13. *Clear.*—This grade shall be clear on both faces, the edges, and the ends, except that sapwood, slight streaks, and light stain shall be permitted. Irregularities of the wood fibers producing a slight configuration, such as a swirl blister or burl effect, shall be permitted, unless accompanied by a knot or encased bark. (Note.—In glued-up hardwood dimension lumber, matching for grain, figure, and color shall be a matter of contract between buyer and seller.)

14. *Clear one face.*—This grade shall be clear on one face, both edges, and both ends, and shall otherwise comply with the clear grade, except that the reverse face may contain defects of a sound nature, including patches and slight imperfections in surfacing. (Note.—In glued-up hardwood dimension lumber, matching for grain, figure, and color shall be a matter of contract between buyer and seller.)

15. *Paint.*—This grade will permit, on the best face, defects of a smooth and sound nature—such as burls, tight knots, or their equivalent, which, when properly filled, will be concealed when finished with nontransparent material. The reverse face or back may contain defects of a sound nature, patches, and slight imperfections in surfacing.

16. *Core.*—This grade shall be sound on both faces, admitting tight sound knots, small worm holes, slight surface checks, or their equivalent. Pieces making up the core may be joined for length, using glued joints, lock, lap, tongued-and-grooved, or butt joints providing no such joint is within 2 in. from the edges or the ends. Patches or plugs in

reasonable amount may also be used provided they are not within 2 in. from the edges or the ends. Wedge patches will be permitted in the ends provided no such patch is within 2 in. of the edge of the piece. Stock shall be surfaced smoothly on both faces.

17. *Sound.*—This grade is a utility grade that may contain any defects that will not materially impair the strength of the individual piece. Slight skips in dressing on either face will be permitted.

#### SQUARES

18. Dimension squares are generally considered as dimension rectangular in cross section but may include stock not more than twice as wide as the thickness. The grades of squares are as follows:

19. *Clear squares.*—This grade shall be clear on all faces, edges, and ends, and shall otherwise conform to the clear grade of flat stock.

20. *Select squares.*—This grade shall be clear on two adjacent sides as specified in the clear grade described above. The other two sides shall be clear one-third of the length of the piece from one end while the other two-thirds may contain sound knots not larger in diameter than one-fourth of the width of the face, small worm holes, bird pecks, slight surface checks, skips in dressing, and wane if it does not extend further inward from the corner than one-fifth of the thickness of either side.

21. *Paint squares.*—This grade will permit on all faces defects of a sound nature—such as burls, small worm holes, smooth tight knots or their equivalent, which will be concealed when properly filled and finished with nontransparent material.

22. *Sound squares.*—This grade will permit on any face, small knots situated so as to cause no material impairment of the strength of the piece, small worm holes, bird pecks, and slight surface checks. Slight skips in dressing and other machining imperfections will be permitted on two adjacent sides of any piece.

#### STANDARD MEASUREMENT METHODS

23. *Thickness.*—In computing the footage of hardwood dimension lumber, the rough nominal thickness required for its manufacture is used. Surface measurement is to apply on rough 1-in. and thinner lumber and board measurement is to apply on lumber over 1-in. rough thickness.

24. *Width.*—In computing footage when edges are surfaced, molded, or sawed to exact width,  $\frac{1}{4}$  in. shall be added to the net finished width if under 6 in. wide and under 50 in. long. If 6 in. or wider, all lengths, and 50 in. or longer, all widths,  $\frac{1}{4}$  in. shall be added to the net finished width. If widths are in fractions of less than eighths of an inch, assume the next higher  $\frac{1}{8}$  in. Pieces under 1 in. wide shall be counted as 1 in. wide.

25. *Length.*—Hardwood dimension lumber when equalized to exact length is measured 1 in. longer than the net finished length. If lengths are in fractions, the measurements shall be to the nearest  $\frac{1}{4}$  in., then add the 1 in. for equalizing. For those measurements falling exactly at midpoint between quarters of an inch, the lower quarter shall be used.

## EXAMPLES OF MEASUREMENT

If S4S and equalized to  $\frac{1}{16} \times 7 \times 16\frac{1}{2}$  in., measure as  $1 \times 7\frac{1}{2} \times 17\frac{1}{2}$  in.  
 If S4S and equalized to  $\frac{1}{16} \times 5\frac{1}{4} \times 17\frac{1}{4}$  in., measure as  $1 \times 5\frac{1}{4} \times 18$  in.  
 If S4S and equalized to  $\frac{1}{4} \times 11\frac{1}{16} \times 20$  in., measure as  $1 \times 11\frac{1}{8} \times 21$  in.  
 If S4S and equalized to  $\frac{1}{4} \times 6\frac{1}{4} \times 74$  in., measure as  $1 \times 6\frac{1}{4} \times 75$  in.  
 If S4S and equalized to  $1\frac{1}{32} \times 3\frac{1}{16} \times 18\frac{1}{16}$  in., measure as  $1\frac{1}{4} \times 4\frac{1}{4} \times 19\frac{1}{4}$  in.  
 If S4S and equalized to  $1\frac{1}{16} \times 1\frac{1}{16} \times 29\frac{1}{2}$  in., measure as  $2 \times 2 \times 30$  in.  
 If S4S and equalized to  $\frac{1}{2} \times 8\frac{1}{16} \times 27\frac{1}{2}$  in., measure as  $1 \times 9\frac{1}{4} \times 28\frac{1}{2}$  in.  
 If S4S and equalized to  $\frac{1}{4} \times 3 \times 58$  in., measure as  $1 \times 3\frac{1}{2} \times 59$  in.  
 If S4S and equalized to  $\frac{1}{2} \times 8\frac{1}{2} \times 12\frac{1}{16}$  in., measure as  $1 \times 9 \times 13\frac{1}{4}$  in.  
 If S4S and equalized to  $\frac{1}{4} \times 4 \times 20\frac{1}{2}$  in., measure as  $1 \times 4\frac{1}{4} \times 21\frac{1}{4}$  in.

## LAMINATED STOCK

26. When flat stock or squares are laminated for thickness, regardless of the number of plies used, the thickness measurement is determined from the standard thicknesses given in table 1 as to the rough thickness of lumber required for solid stock.

## EXAMPLES OF MEASUREMENT

If S4S and equalized to  $2\frac{1}{2} \times 2\frac{1}{2} \times 30$  in., measure as  $2\frac{1}{2} \times 2\frac{1}{2} \times 31$  in.  
 If S4S and equalized to  $2\frac{1}{2} \times 2\frac{1}{2} \times 42$  in., measure as  $3 \times 2\frac{1}{2} \times 43$  in.

TABLE 1. Standard S2S thicknesses

Rough lumber	Surfaced two sides to—		
	Less than 6 in. wide	6 in. and less than 18 in. wide	18 in. and wider
<i>Inches</i>	<i>Inches</i>	<i>Inches</i>	<i>Inches</i>
$\frac{3}{8}$	$\frac{3}{16}$	$\frac{3}{16}$	$\frac{1}{8}$
$\frac{1}{2}$	$\frac{5}{16}$	$\frac{5}{16}$	$\frac{1}{4}$
$\frac{5}{8}$	$\frac{7}{16}$	$\frac{7}{16}$	$\frac{3}{8}$
$\frac{3}{4}$	$\frac{9}{16}$	$\frac{7}{8}$	$\frac{1}{2}$
$\frac{4}{4}$	$1\frac{1}{16}$	$1\frac{1}{8}$	$\frac{3}{4}$
$\frac{5}{4}$	$1\frac{1}{8}$	$1\frac{1}{4}$	1
$\frac{6}{4}$	$1\frac{3}{8}$	$1\frac{3}{8}$	$1\frac{1}{4}$
$\frac{8}{4}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{3}{4}$
$\frac{10}{4}$	$2\frac{1}{4}$	$2\frac{1}{4}$	$2\frac{3}{4}$
$\frac{12}{4}$	$2\frac{3}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$

## TOLERANCES

## 27. Rough dimension.—

27a. A tolerance of plus  $\frac{1}{8}$  in. or minus  $\frac{1}{8}$  in. in thickness and width will be permitted, but not more than 10 percent may be scant in any one size of any one shipment.

27b. A tolerance of plus 1 in. or minus  $\frac{1}{4}$  in. in length will be permitted.

28. Surfaced and semifabricated dimension.—The tolerance for surfaced and semifabricated dimension must necessarily be a combination of the tolerances for rough dimension and completely fabricated dimension. The tolerances covered in paragraph 27, above, shall apply to those portions of the piece which are not machined, while the tolerance covered by paragraph 29, below, shall apply to those portions which are completely fabricated.

29. Completely fabricated dimension.—A tolerance of plus or minus  $\frac{1}{16}$  in. will be permitted in all measurements unless otherwise stipulated.

## INSPECTION

30. All hardwood dimension lumber sold as conforming to the commercial standard grading rules is subject to inspection in the form and condition as received.

30a. *Domestic shipment.*—In case of complaint, the purchaser shall notify the seller within 5 days after receipt of shipment. Any rejected material shall be held intact, properly protected, in its original form for a period up to 3 weeks after notice of rejection, and pending adjustment.


30b. *Export shipment.*—In case of complaint, the purchaser shall notify the seller, by cable, within 2 days after receipt of shipment, and shall make a supporting detailed written report within 5 days after such goods have been received by the purchaser. Any rejected material shall be held intact, properly protected, in its original form for a period up to 5 weeks after notice of rejection, and pending adjustment. Any inspection shall be made by a party agreed upon by the purchaser and seller with complete reports being given to both.

30c. *Quantity.*—Hardwood dimension lumber shall be ordered in specific quantities in terms of number of pieces, sets of pieces, and/or number of feet. The buyer shall accept up to 5 percent overrun in pieces, sets of pieces, or feet in any or all items ordered.

## IDENTIFICATION

31. In order to assure the purchaser that he is getting hardwood dimension lumber of standard quality, producers may, individually or in concert with their trade association, issue certificates declaring conformance to the established standard.

32. In an effort to acquaint the purchaser with the origin of the material he is buying and to extend assurance of its quality, the Hardwood Dimension Manufacturers Association has adopted the certificate shown below.

	<h2>Certificate of Origin</h2>
DATE _____	INVOICE No. _____
<h3>THIS HARDWOOD DIMENSION LUMBER</h3>	
<p>has been manufactured by a member of the</p>	
<h3>HARDWOOD DIMENSION MFRS. ASSN.</h3>	
<p>and is guaranteed by the undersigned to conform to COMMERCIAL STANDARD CS60-48 issued by the NATIONAL BUREAU OF STANDARDS, UNITED STATES DEPARTMENT OF COMMERCE.</p>	
<p>_____ Name of Manufacturer</p>	

GENERAL INFORMATION<sup>1</sup>

33. The following information is not, strictly speaking, a part of the standard, but is furnished for the guidance of producers, distributors, and users of hardwood dimension lumber.

34. In the manufacture of hardwood dimension lumber, utmost care is exercised in machining to specified sizes. Since lumber is a product of nature, the fact must be recognized that atmospheric conditions cause variation in thickness and width.

35. Hardwood dimension lumber should be ordered in specific quantities in terms of number of pieces, sets of pieces, and/or number of feet.

36. To avoid confusion and delay, the following data should be included in any inquiry for prices on hardwood dimension lumber:

Number of pieces.	Finished size:
Part name.	Length.
Kind of lumber.	Width.
Grade.	Thickness.
	Operations to be performed.
	What each part is to be used for.

## RECOMMENDED USES OF VARIOUS GRADES

37. *Clear*.—This grade is recommended for use where both faces, both edges, and both ends are exposed and where strength and appearance are necessary.

38. *Clear one face*.—This grade is recommended for use where only one face, one or both edges, and one or both ends are exposed.

39. *Paint*.—This grade is recommended for use where one face, one or both edges, and one or both ends are smoothly finished and covered with nontransparent material.

40. *Core*.—This grade is recommended as a base for plywood or for large surfaces requiring a sound lumber base or backing of good appearance and strength.

41. *Sound*.—This grade is recommended for purposes where the requirements are such that strength rather than appearance is a characteristic of its use.

42. *Clear squares*.—This grade is recommended for turnings or other purposes where the entire surface area is exposed.

43. *Select squares*.—This grade is recommended for use where a considerable portion of two faces is not exposed, as in case goods, cabinets, etc.

44. *Paint squares*.—This grade is recommended for application where one or more faces are finished and covered with nontransparent material.

45. *Sound squares*.—Sound squares are recommended for use as interior framing or fillers where no part of the piece is exposed and requirements for strength are unimportant.

<sup>1</sup> Additional basic information on wood as a material of construction, with data for its use in design and specifications, may be found in a publication prepared by the Forest Products Laboratory, U. S. Department of Agriculture, entitled "Wood Handbook." Also the U. S. Department of Commerce has issued a booklet, Trade Promotion Series No. 201, entitled "American Hardwood Dimension, Wall Paneling and Interior Trim." Copies of the above publications may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

## ABBREVIATIONS

46. The following standard lumber abbreviations are in common use in contracts and other documents arising in the transactions of purchase and sale of lumber:

Abbreviation	Expression	Abbreviation	Expression
AD	air dried.	in	inch or inches. Also two accent marks (").
a. l.	all lengths.	KD	kiln-dried.
av	average.	k. d.	knocked down.
av. l.	average length.	lbr	lumber.
av. w.	average width.	lgth	length.
a. w.	all widths.	lgr	longer.
B1S	beaded one side.	lin. ft.	linear foot; that is, 12 inches.
B2S	beaded two sides.	LR	log run.
bd	board.	M	thousand.
bd ft	board foot; that is, an area of 1 square foot by 1 inch thick.	M.b.m.	thousand (feet) board measure.
bdl	bundle.	m.l.	mixed lengths.
Bev	beveled.	Mldg	molding.
bm	board (foot) measure.	M.s.m.	thousand (feet) surface measure.
Btr	better.	m.w.	mixed widths.
Cig	ceiling.	N. Eq	not equalized.
Clr	clear.	No.	number.
CM	Center matched; that is, the tongue-and-groove joints are worked along the center of the edges of the piece.	Ord	order.
Com	common.	P	planed.
cu ft	cubic foot.	Pat	pattern.
Dim	dimension.	Pln	plain, as plain sawed.
DS1S	drum sanded 1 side.	Qtd	quartered—when referring to hardwoods.
DS2S	drum sanded 2 sides.	R	rough.
DS4S	drum sanded 4 sides.	rdm	random.
E	edge.	res	resawed.
Eq	equalize.	rip	ripped.
E. G	edge grain.	r.l.	random lengths.
EM	end matched—either center or standard.	rnd	round.
FAS	firsts and seconds—a combined grade of the two upper grades of hardwoods.	r.w.	random width.
f. bk	flat back.	S&E	surfaced one side and one edge.
fcy	factory (lumber).	S1E	surfaced one edge.
F. G	flat grain.	S1S	surfaced one side.
f. o. k	free of knots.	S2S	surfaced two sides.
ft	foot or feet. Also one accent (').	S1S1E	surfaced one side and one edge.
ft b. m.	feet board measure.	S2S1E	surfaced two sides and one edge.
ft s. m.	feet surface measure.	S1S2E	surfaced one side and two edges.
H. bk	hollow back.	S4S	surfaced four sides.
hdwd	hardwood.	S&CM	surfaced one or two sides and center matched.
Hrt	heart.	S2S&CM	surfaced two sides and center matched.
Hrtwd	heartwood.	Sap	sapwood.
1s&2s	Ones and twos—a combined grade of the hardwood grades of firsts and seconds.	Sd	seasoned.
		Sei	select.
		s.f.	surface foot; that is, an area of 1 square foot.

Abbreviation	Expression	Abbreviation	Expression
sftwd.....	softwood.	S. W.....	sound wormy.
Sh. D.....	shipping dry.	Te.....	tennon.
s.m.....	surface measure.	T&G.....	tongued and grooved.
S.n.d.....	sap no defect.	TB&S.....	top, bottom, and sides.
snd.....	sound.	Tbrs.....	timbers.
sq.....	square.	V.G.....	vertical grain.
sqrs.....	squares.	Wth.....	width.
Std.....	standard.	Wdr.....	wider.
stnd.....	stained.	wt.....	weight.
stk.....	stock.		

### HISTORY OF PROJECT

Members of the Hardwood Dimension Manufacturers Association, comprising representative manufacturers of hardwood dimension lumber, had long felt the need of uniform grading specifications and measuring practices. Grading rules were prepared by a committee appointed for that purpose and on January 20, 1936, the cooperation of the National Bureau of Standards was requested in bringing about the general acceptance and use of these rules as a commercial standard for the industry.

After several preliminary meetings, a general conference was called at Louisville, Ky., on June 26, 1936, to which were invited all interested manufacturers, distributors, and users of hardwood dimension lumber, for the purpose of considering and adjusting the proposed commercial standard, as submitted by the Association. After some modifications, the proposed standard was approved at the conference and recommended for circulation to and acceptance by all interested parties. Following written acceptance by a satisfactory majority, the standard was promulgated as CS60-36, effective October 1, 1936.

### FIRST REVISION

Pursuant to a request from the Hardwood Dimension Manufacturers Association dated June 11, 1947, and following approval by the standing committee a revision of this standard was circulated on October 15, 1947, to the trade for written acceptance. The main purpose of the revision was to clarify the description of the methods of measurement used. This revision supersedes both CS60-36 and CS60E-41, since hardwood dimension lumber is now graded and measured on the same basis whether for domestic or export purposes. Following acceptance by a large majority the establishment of the revision was announced on January 26, 1948, as Commercial Standard CS60-48.

### STANDING COMMITTEE

The following individuals comprise the membership of the standing committee, which is to review, prior to circulation for acceptance, revisions proposed to keep the standard abreast of progress. Each organization nominated its own representative. Comment concerning the standard and suggestions for revision may be addressed

to any member of the committee or to the Commodity Standards Division, National Bureau of Standards, which acts as secretary for the committee.

A. F. DENEKE (chairman), Himmelberger-Harrison Mfg. Co., Cape Girardeau, Mo.

J. B. EDWARDS, Hillyer Deutsch Edwards, Inc., Oakdale, La.

OMAR HILTON, Bradley Lumber Co. of Arkansas, Warren, Ark.

CHAS. M. RASCHE, Pekin Wood Products Co., Helena, Ark.

RAY L. PRINE, Michigan Dimension Co., Manistique, Mich.

WILLIAM J. WENZ, Auburn Wood Products, Inc., 13 Osborne Street, Auburn, N. Y.

O. WILLIAM LOWRY, Charles R. Sligh Co., Holland, Mich.

GUY P. DARSEY, Woodward Manufacturing Corp., P. O. Box 1023, Austin, Tex.

MAX HADEN, P. O. Box 801, Jackson, Miss.

#### EFFECTIVE DATE

Having been passed through the regular procedure of the Commodity Standards Division, and approved by the acceptors herein-after listed, this commercial standard was issued by the Department of Commerce, effective from February 25, 1948.

Edwin W. Ely,

*Chief, Commodity Standards Division.*

## ACCEPTANCE OF COMMERCIAL STANDARD

If acceptance has not previously been filed, this sheet properly filled in, signed and returned will provide for the recording of your organization as an acceptor of this commercial standard.

Date \_\_\_\_\_

Commodity Standards Division,  
National Bureau of Standards,  
Washington 25, D. C.

Gentlemen:

We believe that the Commercial Standard CS60-48 constitutes a useful standard of practice, and we individually plan to utilize it as far as practicable in the

Production <sup>1</sup>                      Distribution <sup>1</sup>                      Purchase <sup>1</sup>

of hardwood dimension lumber. We reserve the right to depart from it as we deem advisable.

We understand, of course, that only those articles which actually comply with the standard in all respects can be identified or labeled as conforming thereto.

Signature of authorized officer \_\_\_\_\_  
(in ink)

(Kindly typewrite or print the following lines)

Name and title of above officer \_\_\_\_\_

Organization \_\_\_\_\_  
(Fill in exactly as it should be listed)

Street address \_\_\_\_\_

City, zone, and State \_\_\_\_\_

<sup>1</sup> Underscore which one. Please see that separate acceptances are filed for all subsidiary companies and affiliates which should be listed separately as acceptors. In the case of related interests, trade associations, trade papers, etc., desiring to record their general support, the words "General support" should be added after the signature.

## TO THE ACCEPTOR

The following statements answer the usual questions arising in connection with the acceptance and its significance:

1. *Enforcement.*—Commercial standards are commodity specifications voluntarily established by mutual consent of those concerned. They present a common basis of understanding between the producer, distributor, and consumer, and should not be confused with any plan of governmental regulation or control. The United States Department of Commerce has no regulatory power in the enforcement of their provisions, but since they represent the will of the interested groups as a whole, their provisions through usage soon become established as trade customs, and are made effective through incorporation into sales contracts by means of labels, invoices, and the like.

2. *The acceptor's responsibility.*—The purpose of commercial standards is to establish for specific commodities, nationally recognized grades or consumer criteria and the benefits therefrom will be measurable in direct proportion to their general recognition and actual use. Instances will occur when it may be necessary to deviate from the standard and the signing of an acceptance does not preclude such departures; however, such signature indicates an intention to follow the commercial standard where practicable, in the production, distribution, or consumption of the article in question.

3. *The Department's responsibility.*—The major function performed by the Department of Commerce in the voluntary establishment of commercial standards on a Nation-wide basis is fourfold: first, to act as an unbiased coordinator to bring all interested parties together for the mutually satisfactory adjustment of trade standards; second, to supply such assistance and advice as past experience with similar programs may suggest; third, to canvass and record the extent of acceptance and adherence to the standard on the part of producers, distributors, and users; and fourth, after acceptance, to publish and promulgate the standard for the information and guidance of buyers and sellers of the commodity.

4. *Announcement and promulgation.*—When the standard has been endorsed by a satisfactory majority of production or consumption in the absence of active valid opposition, the success of the project is announced. If, however, in the opinion of the Standing Committee of the Department of Commerce, the support of any standard is inadequate, the right is reserved to withhold promulgation and publication.

## ACCE

The organizations listed below have for use as far as practicable in the pro wood dimension lumber. In accepting depart therefrom as they individually d which actually comply with the requ will be regularly identified or labeled s will require such specific evidence of co

## ASSOCIATIONS

## (General Support)

American Specification Institute, Chicago, Ill.  
Building Officials Conference of America, Inc.  
Washington, D. C.  
Carolina Lumber & Building Supply Association  
Charlotte, N. C.  
Hardwood Dimension Manufacturers Association  
Louisville, Ky.  
Hardwood Plywood Institute, Chicago, Ill.  
Mahogany Association, Inc., Chicago, Ill.  
National Hardwood Lumber Association, Chicago, Ill.  
National Wooden Box Association, Washington, D. C.  
New Jersey Lumbermen's Association, Newark, N. J.  
Prefabricated Home Manufacturers' Institute  
Washington, D. C.  
Southern California Retail Lumber Association  
Los Angeles, Calif.  
Southern Hardwood Producers, Inc., Memphis, Tenn.  
Toy Manufacturers of the U. S. A., Inc., New York, N. Y.  
Veneer Association, The, Chicago, Ill.  
West Coast Lumbermen's Association, Portland, Oreg.

## FIRMS AND OTHER INTERESTS

Albert Furniture Co., Shelbyville, Ind.  
American Chair Co., Sheboygan, Wis.  
American Furniture Co., Batesville, Ind.  
American Lumber Products, Louisville, Ky.  
American Novelty Co., Wellsville, N. Y.  
American Plywood Corp., New London, Wis.  
Anchor Toy Co., Division of Transogram Co., Inc.  
Coudersport, Pa.  
Anderson-Tully Co., Memphis, Tenn.  
Angelina Hardwood Sales Co., Lufkin, Tex.  
Angelus Furniture Manufacturing Co., Los Angeles, Calif.  
Argent Lumber Co., Hardeeville, S. C.  
Atlanta Oak Flooring Co., Atlanta, Ga.  
Ayers-Cihlar-Ransom Co., Chicago, Ill.  
Bailey Lumber Co., Laurel, Miss.  
Baird, David, Co., Camden, N. J.  
Baker-McMillen Co., The, Akron, Ohio.  
Bartlett, O. O., & Snow Co., Cleveland, Ohio.  
Baxter, C. B., & Co., Kansas City, Mo.  
Beck Plywood & Lumber Co., Inc., Chicago, Ill.  
Bennett Bailey Lumber Co., Minneapolis, Minn.  
Bennett Manufacturing Co., The, Westerv Ohio.  
Berkey & Gay Furniture Co., Grand Rapids, Mich.  
Big Rapids Furniture Manufacturing Co., Grand Rapids, Mich.  
Bison Upholstered Furniture Co., Buffalo, N. Y.  
Bissell Carpet Sweeper Co., Grand Rapids, Mich.  
Black, J. W., Lumber Co., Corning, Ark.  
Bradley Lumber Co. of Arkansas, Warren, Ark.  
Bristol Door & Lumber Corp., Bristol, Va., Bristol, Tenn.  
Bruce, E. L., Co., Memphis, Tenn.  
Cannon & Mullen, Salt Lake City, Utah.  
Cavaller Corp., Chattanooga, Tenn.

# ACCEPTORS

CS60-48

The organizations listed below have individually accepted these grading rules for use as far as practicable in the production, distribution, or purchase of hardwood dimension lumber. In accepting this standard, they reserved the right to depart therefrom as they individually deem advisable. It is expected that articles which actually comply with the requirements of this standard in all respects will be regularly identified or labeled as conforming thereto, and that purchasers will require such specific evidence of conformity.

## ASSOCIATIONS (General Support)

American Specification Institute, Chicago, Ill.  
Building Officials Conference of America, Inc., Washington, D. C.  
Carolina Lumber & Building Supply Association, Charlotte, N. C.  
Hardwood Dimension Manufacturers Association, Louisville, Ky.  
Hardwood Plywood Institute, Chicago, Ill.  
Mahogany Association, Inc., Chicago, Ill.  
National Hardwood Lumber Association, Chicago, Ill.  
National Wooden Box Association, Washington, D. C.  
New Jersey Lumbermen's Association, Newark, N. J.  
Prefabricated Home Manufacturers' Institute, Washington, D. C.  
Southern California Retail Lumber Association, Los Angeles, Calif.  
Southern Hardwood Producers, Inc., Memphis, Tenn.  
Toy Manufacturers of the U. S. A., Inc., New York, N. Y.  
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American Lumber Products, Louisville, Ky.  
American Novelty Co., Wellsville, N. Y.  
American Plywood Corp., New London, Wis.  
Anchor Toy Co., Division of Transogram Co., Inc., Coudersport, Pa.  
Anderson-Tully Co., Memphis, Tenn.  
Angelina Hardwood Sales Co., Lufkin, Tex.  
Angelus Furniture Manufacturing Co., Los Angeles, Calif.  
Argent Lumber Co., Hardeeville, S. C.  
Atlanta Oak Flooring Co., Atlanta, Ga.  
Ayers-Chihlar-Ransom Co., Chicago, Ill.  
Bailey Lumber Co., Laurel, Miss.  
Baird, David, Co., Camden, N. J.  
Baker-McMillan Co., The, Akron, Ohio.  
Bartlett, C. O., & Snow Co., Cleveland, Ohio.  
Baxter, C. B., & Co., Kansas City, Mo.  
Beck Plywood & Lumber Co., Inc., Chicago, Ill.  
Bennett Bailey Lumber Co., Minneapolis, Minn.  
Bennett Manufacturing Co., The, Westerville, Ohio.  
Berkey & Gay Furniture Co., Grand Rapids, Mich.  
Big Rapids Furniture Manufacturing Co., Big Rapids, Mich.  
Bison Upholstered Furniture Co., Buffalo, N. Y.  
Bissell Carpet Sweeper Co., Grand Rapids, Mich.  
Black, J. W., Lumber Co., Corning, Ark.  
Bradley Lumber Co. of Arkansas, Warren, Ark.  
Bristol Door & Lumber Corp., Bristol, Va., and Bristol, Tenn.  
Bruce, E. L. Co., Memphis, Tenn.  
Cannon & Mullen, Salt Lake City, Utah.  
Cavalier Corp., Chattanooga, Tenn.

Cellarius, Chas. F., Cincinnati, Ohio.  
Central Chair Manufacturing Co., Philadelphia, Pa.  
Chapin, Rollin C., Minneapolis, Minn. (General support.)  
Chattahoochee Furniture Co., Flowery Branch, Ga.  
Cherry River Boom & Lumber Co., Richwood, W. Va.  
Cincinnati Butchers Supply Co., The, Cincinnati, Ohio.  
Coffin, R. V., Seattle, Wash.  
Coolidge, Shepley, Bulfinch & Abbott, Boston, Mass.  
Corbin Cabinet Lock Division, The American Hardware Corp., New Britain, Conn.  
Cox, Chas. O., Corp., Memphis, Tenn.  
Cram & Ferguson, Boston, Mass.  
Crane & MacMahon, Inc., St. Marys, Ohio.  
Crawford Furniture Manufacturing Corp., Jamestown, N. Y.  
Crompton & Knowles Loom Works, Worcester, Mass.  
Cron-Kills Co., Inc., Piqua, Ohio.  
Cross, Austin & Ireland Lumber Co., Brooklyn, N. Y.  
Crowell & Lancaster, Bangor, Maine.  
Curtis Cos., Inc., Clinton, Iowa.  
Davis Furniture Corp., Jamestown, N. Y.  
De Soto Hardwood Flooring Co., Memphis, Tenn.  
DeWeese Wood Products Co., Philadelphia, Miss.  
Dierks Lumber & Coal Co., Kansas City, Mo.  
Edison, Thomas A. Inc., West Orange, N. J.  
Elliott Hardwood Co., Inc., Potsdam, N. Y.  
Ellis, Wm. C., & Sons Iron Works, Memphis, Tenn.  
Emery Industries, Inc., Cincinnati, Ohio.  
Empire Furniture Corp., Johnson City, Tenn.  
Engelberg Huller Co., Inc., Syracuse, N. Y.  
English, Miller & Hockett, Hutchinson, Kans.  
Estes Lumber Co., Birmingham, Ala.  
Euclid Wood Products Co., Cleveland, Ohio.  
Falcon Manufacturing Co., Big Rapids, Mich.  
Farrin, M. B., Lumber Co., Cincinnati, Ohio.  
Ferguson, W. T., Lumber Co., St. Louis, Mo.  
Ferguson Manufacturing Co., Inc., San Francisco, Calif.  
Fink & Schindler Co., The, San Francisco, Calif.  
Fordyce Wood Products, Inc., Fordyce, Ark.  
Foster Bros. Manufacturing Co., Utica, N. Y.  
Frankson Furniture Manufacturing Corp., New York, N. Y.  
Frost Lumber Industries, Inc., Shreveport, La.  
Fuller, G., & Son Lumber Co., Brighton, Mass.  
Gamble Brothers, Inc., Louisville, Ky.  
Gem Manufacturing Corp., Bascom, Ohio.  
Gloekler Refrigerator Co., Erie, Pa.  
Grand Rapids Chair Co., Grand Rapids, Mich.  
Grand Rapids Store Equipment Co., Grand Rapids, Mich.  
Greene & Wood, Inc., New Bedford, Mass.  
Gundlach, P. M., Sons, Belleville, Ill.  
Gunn Furniture Co., Grand Rapids, Mich.  
Hagemeyer Lumber Co., Cincinnati, Ohio.  
Hale Co., Inc., East Arlington, Vt.  
Halsam Products Co., Inc., Chicago, Ill.  
Harbor Sales Co., Inc., The Baltimore, Md.  
Harris Hardwood Co., Inc., Roanoke, Va.  
Hawley, John, Ontonagon, Mich.  
Haxby, Bissell & Belair, Minneapolis, Minn.  
Henderson-Molpus Co., Philadelphia, Miss.

- Himmelberger-Harrison Manufacturing Co., Cape Girardeau, Mo.  
 Hinkley, Dwight, Lumber Co., The, Cincinnati, Ohio.  
 Holly Hill Cypress Co., Holly Hill, S. C.  
 Holzman, Holzman & Klekamp, Chicago, Ill.  
 Hoopes Bro. & Darlington, Inc., W. Chester, Pa.  
 Hoosier Desk Co., Jasper, Ind.  
 Hope, Frank L., San Diego, Calif.  
 Horner Wood Products Co., Inc., Dollar Bay, Mich.  
 Howell, Leslie D., Portland, Oreg. (General support.)  
 Hunt, Robert W., Co., St. Louis, Mo.  
 Huntingburg Furniture Co., Inc., Huntingburg, Ind.  
 Hygrade Cabinet Co., Mt. Vernon, N. Y.  
 Ideal Desk Co., Auburn, Maine.  
 Indiana Lumber & Supply Co., Inc., Indiana, Pa.  
 James Lumber Co., Boston, Mass.  
 Jamestown Table Co., Salamanca, N. Y.  
 Jasper Novelty Furniture Co., Inc., Jasper, Ind.  
 Johnson-Carper Furniture Co., Inc., Roanoke, Va.  
 Kansas State College, Department of Architecture, Manhattan, Kans.  
 Keely, Hal, Plywood Co., Pittsburgh, Pa.  
 Kent-Coffey Manufacturing Co., Lenoir, N. C.  
 Kewaunee Manufacturing Co., Adrian, Mich.  
 Kilham, Hopkins & Greeley, Boston, Mass.  
 Kindel Furniture Co., Grand Rapids, Mich.  
 Kingsley Furniture Co., Inc., La Porte, Ind.  
 Klerner, Peter, Furniture Corp., New Albany, Ind.  
 Lange & Christ Box & Lumber Co., Inc., Clarksburg, W. Va.  
 Latenser, John, & Sons, Omaha, Nebr.  
 Law, Law, Potter & Nystrom, Madison, Wis.  
 Lawsonia Manufacturing Co., Inc., Philadelphia, Pa.  
 Levin Bros., Inc., Minneapolis, Minn.  
 Levy, Will, St. Louis, Mo.  
 Loeb, Laurence M., White Plains, N. Y.  
 Long-Bell Lumber Co., The (Hudson River Division), DeRidder, La.  
 Los Angeles Period Furniture Manufacturing Co., Los Angeles, Calif.  
 Louck & Hill Co., Richmond, Ind.  
 Louisville Chair & Furniture Co., Louisville, Ky.  
 Lovatt, George I., Philadelphia, Pa.  
 Lundstrom, C. J., Manufacturing Co., The, Little Falls, N. Y.  
 Markland, M. B., Contracting Co., Atlantic City, N. J.  
 Marsh Furniture Co., High Point, N. C.  
 Mason, George D., & Co., Detroit, Mich.  
 Meadow River Lumber Co., Rainelle, W. Va.  
 Meier & Pohlmann Furniture Co., St. Louis, Mo.  
 Meloy Manufacturing Co., Shelbyville, Ind.  
 Memphis Hardwood Flooring Co., Memphis, Tenn.  
 Menasha Wooden Ware Corp., Menasha, Wis.  
 Mersman Bros. Corp., The, Celina, Ohio.  
 Michigan Dimension Co., Manistique, Mich.  
 Michigan Maple Block Co., Petoskey, Mich.  
 Miller & Vrydagh, Terre Haute, Ind.  
 Mills Industries, Inc., Chicago, Ill.  
 Minneapolis Desk Manufacturing Co., Minneapolis, Minn.  
 Minneapolis-Moline Power Implement Co., Minneapolis, Minn.  
 Missouri Furniture Co., St. Louis, Mo.  
 Monteath, J. H., Co., New York, N. Y.  
 Montgomery Ward, Chicago, Ill.  
 Moore, J. W., New Orleans, La.  
 Morgan Furniture Co., Asheville, N. C.  
 Morgan Manufacturing Co., Inc., Black Mountain, N. C.  
 Morris Furniture Manufacturing Co., Inc., Los Angeles, Calif.  
 Morris, C. L., Lumber Co., Plymouth, Ind.  
 Mutschler Brothers Co., Nappanee, Ind.  
 Myrtle Desk Co., High Point, N. C.  
 National Furniture Manufacturing Co., Evansville, Ind.  
 New York & Brooklyn Casket Co., Brooklyn, N. Y.  
 New York Wood Working Corp., Flushing, N. Y.  
 Newman, S., & Sons, Philadelphia, Pa.  
 Newton & Thompson, Inc., Brandon, Vt.  
 Nicky Brothers, Inc., Memphis, Tenn.  
 Northwestern Furniture Co., Milwaukee, Wis.  
 Olive & Myers Manufacturing Co., Dallas, Tex.  
 Paldar, Emil J., Co., Chicago, Ill.  
 Patten Blinn Lumber Co., Los Angeles, Calif.  
 Patzig Testing Laboratories, Des Moines, Iowa.  
 Pehrson, G. A., & Associates, Spokane, Wash.  
 Perfect Parlor Furniture Co., Inc., Chicago, Ill.  
 Phenix, L. C., Co., Los Angeles, Calif.  
 Phenix Furniture Co., Warren, Pa.  
 Phoenix Chair Co., Sheboygan, Wis.  
 Picket Lumber Co., Pittsburgh, Pa.  
 Portsmouth Lumber Corp., Portsmouth, Va.  
 Precision-Built Homes Corp., Trenton, N. J.  
 Quigley Furniture Co., Whitesboro, N. Y.  
 Randolph Furniture Works, Jamestown, N. Y.  
 Resnikoff, Abraham, New York, N. Y.  
 Reynolds & Manley Lumber Co., Savannah, Ga.  
 Richardson Bros. Co., Sheboygan Falls, Wis.  
 Richmond Cabinet Co., Richmond, Ind.  
 Richmond Furniture Manufacturing Co., Richmond, Ind.  
 Ritchie, James H., & Associates, Boston, Mass.  
 Ritter, W. M., Lumber Co., Columbus, Ohio.  
 Rockford Furniture Co., Rockford, Ill.  
 Rockford National Furniture Co., Rockford, Ill.  
 St. Croix Manufacturing Co., Bayport, Minn.  
 Seaburg Manufacturing Co., Jamestown, N. Y.  
 Sears Roebuck & Co., Chicago, Ill.  
 Sellers, G. I., & Sons Co., Elwood, Ind.  
 Sells Lumber & Manufacturing Co., Johnson City, Tenn.  
 Setter Bros., Inc., Cattaraugus, N. Y.  
 Shelbyville Desk Co., Shelbyville, Ind.  
 Sherman-Manson Corp., St. Marys, Ohio.  
 Sholar, H. W., Lumber Co., Lenoir, N. C.  
 Sjostrom, John E., Co., Philadelphia, Pa.  
 Sligh-Lowry Furniture Co., Holland, Mich.  
 Smith Cabinet Manufacturing Co., Inc., Salem, Ind.  
 Smith, W. T., Lumber Co., Chapman, Ala.  
 Spencer Cardinal Corp., Marion, Ind.  
 Springfield Furniture Works, Inc., Springfield, Ohio.  
 Standard Cabinet Manufacturing Co., Peru, Ind.  
 Standard Chair Co., Union City, Pa.  
 Standard Furniture Co., Harkimer, N. Y.  
 Staub & Rafter, Houston, Tex.  
 Stoetzel, Ralph, Chicago, Ill.  
 Sumter Cabinet Co., Sumter, S. C.  
 Sun Lumber Co., The, Weston, W. Va.  
 Sweat-Comings Co., The, Richford, Vt.  
 Taylor, Ellery Kirke, Haddonfield, N. J.  
 Temple, S. J.—Arthur Temple, Davenport, Iowa.  
 Temple Lumber Co., Pineland, Tex.  
 Toledo Metal Furniture Co., The, Toledo, Ohio.  
 Trogdon Furniture Co., Toccoa, Ga.  
 Tulane Hardwood Lumber Co., Inc., New Orleans, La.  
 Tygard Valley Wood Products Corp., Dailey, W. Va.  
 Union Furniture Co., Batesville, Ind.  
 United Furniture Corp., Lexington, N. C.  
 Valley Furniture Co., Inc., St. Louis, Mo.  
 Virginia Polytechnic Institute, Blacksburg, Va. (General support.)  
 Ward Furniture Manufacturing Co., Fort Smith, Ark.  
 Weber Showcase & Fixture Co., Inc., Los Angeles, Calif.  
 Weiman Co., The, Rockford, Ill.  
 Wells, J. W., Lumber Co., Montgomery, Ala.  
 West, Albert E., Boston, Mass.  
 West Virginia Wood Products Corp., Morgantown, W. Va.  
 Western Furniture Co., Inc., Batesville, Ind.  
 Wood Cellulose Products Co., Chattahoochee, Fla.  
 Woodstock Manufacturing Co., Inc., The, Charleston, S. C.  
 Wright & Wright, Detroit, Mich. (General support.)

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- Agriculture, U. S. Department of, Division of Purchase, Sales & Traffic, Washington, D. C.  
 Agriculture, U. S. Department of, Forest Service, Missoula, Mont.  
 Public Housing Administration, Chicago, Ill., and Washington, D. C.  
 Veterans' Administration, Washington, D. C.

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ASSOCIATIONS

(General Support)

Douglas Fir Plywood Association, Tacoma, Wash.  
Wisconsin Retail Lumbermen's Association, Milwaukee, Wis.

FIRMS AND OTHER INTERESTS

Andrews, C. E., Lumber Co., New Bethlehem, Pa.  
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Bay View Furniture Co., Holland, Mich.  
Bradley, David, Manufacturing Works, Bradley, Ill.  
Bernhardt Furniture Co., Lenoir, N. C.  
Brown Saltman Furniture Co., South Gate, Calif.  
Carey Manufacturing Co., Inc., Keene, N. H.  
Chillicothe Furniture Manufacturing Co., Chillicothe, Mo.  
Coolerater Co., The, Duluth, Minn.  
Doebler Metal Products Corp., New York, N. Y.  
Exchange Lumber & Manufacturing Co., Spokane, Wash.  
Fry-Fulton Lumber Co., St. Louis, Mo.  
Gluck Bros., Inc., Morristown, Tenn.  
Haden, Max M., Co., Inc., Jackson, Miss.  
Hardwood Dimensions, Inc., Irvington, N. J.  
Hillyer-Deutsch-Edwards, Inc., Oakdale, La.  
Huber Manufacturing Co., The, Marion, Ohio.

Huttig Sash & Door Co., St. Louis, Mo.  
King Lumber Industries, Canton, Miss.  
Kittinger Co., Inc., Buffalo, N. Y.  
Louisiana Lumber Co., Cairo, Ill.  
Mason Manufacturing Co., The, Los Angeles, Calif.  
Mell Lumber Co., Philadelphia, Pa.  
Miller Brothers Co., Inc., Johnson City, Tenn., and Knoxville, Tenn.  
Morrison-Merrill & Co., Salt Lake City, Utah.  
Munsing Wood Products Co., Inc., Chicago, Ill.  
New England Woodshop Co., Greenville, N. H.  
Olsen, O. C. S., Co., Chicago, Ill.  
Phoenix Wood Products Co., Inc., Brooklyn, N. Y.  
Pineville Wood Products, Inc., Pineville, La.  
Root, A. I., Co., The, Medina, Ohio.  
Saginaw Cabinet Co., Chicago, Ill.  
Sehuc Industries, Inc., Kansas City, Mo.  
Sheboygan Chair Co., Inc., Sheboygan, Wis.  
Singer Cabinet Shops, Inc., New York, N. Y.  
Vestal Lumber & Manufacturing Co., Knoxville, Tenn.  
Wels Manufacturing Co., The, Monroe, Mich.  
Woodward Manufacturing Corp., Austin, Tex.

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Federal Works Agency, Public Buildings Administration, Washington, D. C. (General support.)  
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